



# THE INTEGRATED CIRCUIT DATA BOOK



**MOTOROLA** *Semiconductor Products Inc.*



## GENERAL INFORMATION

Index  
Interchangeability Guide  
Digital Circuits Applications Selector Guide

### MECL

MECL MC300/MC350 Series  
MECL II MC1000/MC1200 Series

### MHTL

MC660 Series

### MTTL

MTTL MC500/MC400 Series  
MTTL II MC2100/MC2000 Series  
MTTL III MC3000 Series

### MDTL

MDTL MC930/MC830 Series  
DTL MC200/MC250 Series

### MRTL

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mW MRTL MC908/MC808 Series  
Plastic MRTL MC700P/MC800P Series  
Commercial MRTL MC700 Series

### MOS

MC1120P Series

## COMPLEX ARRAYS

### LINEAR

Application Selector Guide  
Operational Amplifiers  
High-Frequency Amplifiers  
Power Amplifiers  
Differential Amplifiers  
Sense Amplifiers  
Stereo Preamplifiers

## APPLICATION NOTES

# THE INTEGRATED CIRCUIT DATA BOOK

In the entire dynamic history of electronics, no facet of the industry has moved as rapidly from concept to implementation as has the field of integrated circuits. Already, after only 10 years of development, integrated circuits are replacing discrete-component circuits in all major computer applications and in many other digital functions as well. The linear area of applications, though somewhat lagging the digital field, is now expanding at a rate reminiscent of earlier days when new designs were emerging from the laboratories faster than they could be effectively introduced to the marketplace.

Since an integrated circuit represents a significantly larger portion of each equipment design than any single discrete component, the design engineers' cognizance of new products and their capabilities becomes increasingly vital. To the dissemination of this information, in the most useful form, the Integrated Circuit Data Book is dedicated.

This Data Book contains data sheet specifications and other applications and test data for all standard Motorola integrated circuits manufactured at the time of its publication. A complete, alpha-numeric index, page 1-1, lists and identifies all devices contained in the book and refers the reader to the proper section and page number where each device is fully characterized. Tabbed contents pages at the front and back of the book provide quick entry to the specific device section of interest.

The book covers both digital and linear integrated circuits. The digital families are subdivided as needed to group complete information for a specific logic series — data sheets and general information containing the major features and applications of that specific series. In addition, a complete "spread" of logic diagrams is included to permit quick selection of a first-order device lineup for most efficient system implementation.

The linear device section fully characterizes circuits encompassing the entire range of applications from audio to RF. A quick selection guide at the front of this section provides rapid comparison of the various circuits.

In view of the rapidly expanding technology, no book of this type can hope to remain current for any extended period of time. Therefore, the Integrated Circuit Data Book will be updated with a minimum of two supplements, as described on the following page, before the second edition of the Data Book will be published. In this way, it is hoped this effort provides a needed service that will result in significant savings of search time in the implementation of integrated circuit systems.

The information in this book has been carefully checked and is believed to be reliable; however, no responsibility is assumed for inaccuracies. Furthermore, this information does not convey to the purchaser of semiconductor devices any license under the patent rights of any manufacturer.

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1st Edition, August 1968



# DATA BOOK

## UPDATING SERVICE

Because of large numbers of new integrated circuit devices introduced each year, provisions have been made to update the Integrated Circuit Data Book through the publication of Supplements. At least two supplements will be published during the year. The Supplements will contain complete data sheets for newly added Motorola devices.

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MC2056F,P		4-85	MC9721P	Plastic mW MRTL	6-217
MC2057F,P		4-72	MC9819F	MRTL	6-86
MC2059F,P		4-76	MC9819P	Plastic MRTL	6-219
MC2060F,P		4-81	MC9821F	mW MRTL	6-148
MC2063F,P		4-74	MC9821P	Plastic mW MRTL	6-217
MC2100F		4-66	MC9919F	MRTL	6-86
MC2101F		4-68	MC9921F	mW MRTL	6-148
MC2102F		4-87	XC157	Multi-Gate Array	8-3
MC2103F		4-64			

## INTERCHANGEABILITY GUIDE

The following cross-reference lists integrated circuits from a number of major manufacturers, and indicates the direct replacement type. Due to the variety of packages on the market, there may be slight differences in outline dimensions.

### DIGITAL INTEGRATED CIRCUITS

#### MECL

Part Number	Motorola Direct Replacement	Description
RCA		
CD2150F	MC1050F	Dual 4-Input OR/NOR Gate
CD2151F	MC1051F	Dual 4-Input OR/NOR Gate
CD2152F	MC1052F	Single 8-Input OR/NOR Gate
Stewart-Warner		
SW301F	MC301F	5-Input OR/NOR Gate
SW301T	MC301G	5-Input OR/NOR Gate
SW302F	MC302F	R-S Flip-Flop
SW302T	MC302G	R-S Flip-Flop
SW303F	MC303F	Half Adder
SW303T	MC303G	Half Adder
SW304F	MC304F	Bias Driver
SW304T	MC304G	Bias Driver
SW305F	MC305F	5-Input Gate Expander
SW305T	MC305G	5-Input Gate Expander
SW306F	MC306F	3-Input OR/NOR Gate
SW306T	MC306G	3-Input OR/NOR Gate
SW307F	MC307F	3-Input OR/NOR Gate
SW307T	MC307G	3-Input OR/NOR Gate
SW308F	MC308F	AC-Coupled J-K Flip-Flop
SW308T	MC308G	AC-Coupled J-K Flip-Flop
SW309F	MC309F	Dual 2-Input NOR Gate
SW309T	MC309G	Dual 2-Input NOR Gate
SW310F	MC310F	Dual 2-Input NOR Gate
SW310T	MC310G	Dual 2-Input NOR Gate
SW311F	MC311F	Dual 2-Input NOR Gate
SW311T	MC311G	Dual 2-Input NOR Gate
SW351F	MC351F	5-Input OR/NOR Gate
SW351T	MC351G	5-Input OR/NOR Gate
SW352AF	MC352AF	R-S Flip-Flop
SW352AT	MC352AG	R-S Flip-Flop
SW353F	MC353F	Half Adder
SW353T	MC353G	Half Adder
SW354F	MC354F	Bias Driver
SW354T	MC354G	Bias Driver
SW355F	MC355F	5-Input Gate Expander
SW355T	MC355G	5-Input Gate Expander
SW356F	MC356F	3-Input OR/NOR Gate
SW356T	MC356G	3-Input OR/NOR Gate
SW357F	MC357F	3-Input OR/NOR Gate
SW357T	MC357G	3-Input OR/NOR Gate
SW358AF	MC358AF	AC-Coupled J-K Flip-Flop
SW358AT	MC358AG	AC-Coupled J-K Flip-Flop

Part Number	Motorola Direct Replacement	Description
SW359F	MC359F	Dual 2-Input NOR Gate
SW359T	MC359G	Dual 2-Input NOR Gate
SW360F	MC360F	Dual 2-Input NOR Gate
SW360T	MC360G	Dual 2-Input NOR Gate
SW361F	MC361F	Dual 2-Input NOR Gate
SW361T	MC361G	Dual 2-Input NOR Gate
Westinghouse		
WC377	MC1023P*	Dual 4-Input OR/NOR Clock Driver

\* Not pin-for-pin replacement

#### MTTL

Sylvania		
SF-10-02	MC513F	R-S Flip-Flop
SF-11-02	MC563F	R-S Flip-Flop
SF-12-02	MC413F	R-S Flip-Flop
SF-13-02	MC463F	R-S Flip-Flop
SF-50-02	MC515F	AND J-K Flip-Flop
SF-51-02	MC565F	AND J-K Flip-Flop
SF-52-02	MC415F	AND J-K Flip-Flop
SF-52-P	MC415P	AND J-K Flip-Flop
SF-53-02	MC465F	AND J-K Flip-Flop
SF-53-P	MC465P	AND J-K Flip-Flop
SF-60-02	MC516F	OR J-K Flip-Flop
SF-61-02	MC566F	OR J-K Flip-Flop
SF-62-02	MC416F	OR J-K Flip-Flop
SF-62-P	MC416P	OR J-K Flip-Flop
SF-63-02	MC466F	OR J-K Flip-Flop
SF-63-P	MC466P	OR J-K Flip-Flop
SG-40-02	MC500F	Dual 4-Input NAND Gate
SG-41-02	MC550F	Dual 4-Input NAND Gate
SG-42-02	MC400F	Dual 4-Input NAND Gate
SG-42-P	MC400P	Dual 4-Input NAND Gate
SG-43-02	MC450F	Dual 4-Input NAND Gate
SG-43-P	MC450P	Dual 4-Input NAND Gate
SG-50-02	MC501F	Expandable 4-Wide 2-2-2-3 Input AND-OR-INVERT Gate
SG-51-02	MC551F	Expandable 4-Wide 2-2-2-3 Input AND-OR-INVERT Gate
SG-52-02	MC401F	Expandable 4-Wide 2-2-2-3 Input AND-OR-INVERT Gate
SG-52-P	MC401P	Expandable 4-Wide 2-2-2-3 Input AND-OR-INVERT Gate

## MTTL (cont.)

Part Number	Motorola Direct Replacement	Description
SG-53-02	MC451F	Expandable 4-Wide 2-2-2-3 Input AND-OR-INVERT Gate
SG-53-P	MC451P	Expandable 4-Wide 2-2-2-3 Input AND-OR-INVERT Gate
SG-60-02	MC502F	Single 8-Input NAND Gate
SG-61-02	MC552F	Single 8-Input NAND Gate
SG-62-02	MC402F	Single 8-Input NAND Gate
SG-62-P	MC402P	Single 8-Input NAND Gate
SG-63-02	MC452F	Single 8-Input NAND Gate
SG-63-P	MC452P	Single 8-Input NAND Gate
SG-70-02	MC520F	Dual Expandable 2-Wide, 2-Input AND-OR-INVERT Gate
SG-71-02	MC570F	Dual Expandable 2-Wide, 2-Input AND-OR-INVERT Gate
SG-72-02	MC420F	Dual Expandable 2-Wide, 2-Input AND-OR-INVERT Gate
SG-72-P	MC420P	Dual Expandable 2-Wide, 2-Input AND-OR-INVERT Gate
SG-73-02	MC470F	Dual Expandable 2-Wide, 2-Input AND-OR-INVERT Gate
SG-73-P	MC470P	Dual Expandable 2-Wide, 2-Input AND-OR-INVERT Gate
SG-90-02	MC503F	2-Wide 3-Input AND-OR-INVERT Gate with Gated Complement
SG-91-02	MC553F	2-Wide 3-Input AND-OR-INVERT Gate with Gated Complement
SG-92-02	MC403F	2-Wide 3-Input AND-OR-INVERT Gate with Gated Complement
SG-93-02	MC453F	2-Wide 3-Input AND-OR-INVERT Gate with Gated Complement
SG-100-02	MC504F	Expandable 3-Wide 3-Input AND-OR-INVERT Gate
SG-101-02	MC554F	Expandable 3-Wide 3-Input AND-OR-INVERT Gate
SG-102-02	MC404F	Expandable 3-Wide 3-Input AND-OR-INVERT Gate
SG-102-P	MC404P	Expandable 3-Wide 3-Input AND-OR-INVERT Gate
SG-103-02	MC454F	Expandable 3-Wide 3-Input AND-OR-INVERT Gate
SG-103-P	MC454P	Expandable 3-Wide 3-Input AND-OR-INVERT Gate
SG-110-02	MC505F	Expandable 2-Wide 4-Input AND-OR-INVERT Gate
SG-111-02	MC555F	Expandable 2-Wide 4-Input AND-OR-INVERT Gate

Part Number	Motorola Direct Replacement	Description
SG-112-02	MC405F	Expandable 2-Wide 4-Input AND-OR-INVERT Gate
SG-112-P	MC405P	Expandable 2-Wide 4-Input AND-OR-INVERT Gate
SG-113-02	MC455F	Expandable 2-Wide 4-Input AND-OR-INVERT Gate
SG-113-P	MC455P	Expandable 2-Wide 4-Input AND-OR-INVERT Gate
SG-120-02	MC506F	Expandable 8-Input NAND Gate
SG-121-02	MC556F	Expandable 8-Input NAND Gate
SG-122-02	MC406F	Expandable 8-Input NAND Gate
SG-123-02	MC456F	Expandable 8-Input NAND Gate
SG-130-02	MC507F	Dual 4-Input Line Driver
SG-131-02	MC557F	Dual 4-Input Line Driver
SG-132-02	MC407F	Dual 4-Input Line Driver
SG-132-P	MC407P	Dual 4-Input Line Driver
SG-133-02	MC457F	Dual 4-Input Line Driver
SG-133-P	MC457P	Dual 4-Input Line Driver
SG-140-02	MC508F	Quad 2-Input NAND Gate
SG-141-02	MC558F	Quad 2-Input NAND Gate
SG-142-02	MC408F	Quad 2-Input NAND Gate
SG-142-P	MC408P	Quad 2-Input NAND Gate
SG-143-02	MC458F	Quad 2-Input NAND Gate
SG-143-P	MC458P	Quad 2-Input NAND Gate
SG-150-02	MC509F	4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates
SG-151-02	MC559F	4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates
SG-152-02	MC409F	4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates
SG-152-P	MC409P	4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates
SG-153-02	MC459F	4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates
SG-153-P	MC459P	4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates
SG-170-02	MC510F	Dual 4-Input Expander for AND-OR-INVERT Gates
SG-171-02	MC560F	Dual 4-Input Expander for AND-OR-INVERT Gates
SG-172-02	MC410F	Dual 4-Input Expander for AND-OR-INVERT Gates

**MTTL (cont.)**

Part Number	Motorola Direct Replacement	Description
SG-172-P	MC410P	Dual 4-Input Expander for AND-OR-INVERT Gates
SG-173-02	MC460F	Dual 4-Input Expander for AND-OR-INVERT Gates
SG-173-P	MC460P	Dual 4-Input Expander for AND-OR-INVERT Gates
SG-180-02	MC511F	Dual 4-Input Expander for NAND Gates
SG-181-02	MC561F	Dual 4-Input Expander for NAND Gates
SG-182-02	MC411F	Dual 4-Input Expander for NAND Gates
SG-183-02	MC461F	Dual 4-Input Expander for NAND Gates
SG-190-02	MC512F	Triple 3-Input NAND Gate
SG-191-02	MC562F	Triple 3-Input NAND Gate
SG-192-02	MC412F	Triple 3-Input NAND Gate
SG-192-P	MC412P	Triple 3-Input NAND Gate
SG-193-02	MC462F	Triple 3-Input NAND Gate
SG-193-P	MC462P	Triple 3-Input NAND Gate

**MTTL II**

Sylvania		
SF-250-02	MC2109F	AND J-K Flip-Flop
SF-251-02	MC2159F	AND J-K Flip-Flop
SF-252-02	MC2009F	AND J-K Flip-Flop
SF-253-02	MC2059F	AND J-K Flip-Flop
SF-260-02	MC2110F	OR J-K Flip-Flop
SF-261-02	MC2160F	OR J-K Flip-Flop
SF-262-02	MC2010F	OR J-K Flip-Flop
SF-263-02	MC2060F	OR J-K Flip-Flop
SG-210-02	MC2100F	Expandable 2-Wide 4-Input AND-OR INVERT Gate
SG-211-02	MC2150F	Expandable 2-Wide 4-Input AND-OR INVERT Gate
SG-212-02	MC2000F	Expandable 2-Wide 4-Input AND-OR INVERT Gate
SG-212-P	MC2000P	Expandable 2-Wide 4-Input AND-OR INVERT Gate
SG-213-02	MC2050F	Expandable 2-Wide 4-Input AND-OR INVERT Gate
SG-213-P	MC2050P	Expandable 2-Wide 4-Input AND-OR INVERT Gate
SG-220-02	MC2101F	Quad 2-Input NAND Gate
SG-221-02	MC2151F	Quad 2-Input NAND Gate
SG-222-02	MC2001F	Quad 2-Input NAND Gate
SG-222-P	MC2001P	Quad 2-Input NAND Gate
SG-223-02	MC2051F	Quad 2-Input NAND Gate
SG-223-P	MC2051P	Quad 2-Input NAND Gate

Part Number	Motorola Direct Replacement	Description
SG-230-02	MC2102F	4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates
SG-231-02	MC2152F	4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates
SG-232-02	MC2002F	4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates
SG-232-P	MC2002P	4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates
SG-233-02	MC2052F	4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates
SG-233-P	MC2052P	4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates
SG-240-02	MC2103F	Dual 4-Input NAND Gate
SG-241-02	MC2153F	Dual 4-Input NAND Gate
SG-242-02	MC2003F	Dual 4-Input NAND Gate
SG-242-P	MC2003P	Dual 4-Input NAND Gate
SG-243-02	MC2053F	Dual 4-Input NAND Gate
SG-243-P	MC2053P	Dual 4-Input NAND Gate
SG-250-02	MC2104F	Expandable 4-Wide 2-2-2-3 Input AND-OR-INVERT Gate
SG-251-02	MC2154F	Expandable 4-Wide 2-2-2-3 Input AND-OR-INVERT Gate
SG-252-02	MC2004F	Expandable 4-Wide 2-2-2-3 Input AND-OR-INVERT Gate
SG-252-P	MC2004P	Expandable 4-Wide 2-2-2-3 Input AND-OR-INVERT Gate
SG-253-02	MC2054F	Expandable 4-Wide 2-2-2-3 Input AND-OR-INVERT Gate
SG-253-P	MC2054P	Expandable 4-Wide 2-2-2-3 Input AND-OR-INVERT Gate
SG-260-02	MC2105F	Single 8-Input NAND Gate
SG-261-02	MC2155F	Single 8-Input NAND Gate
SG-262-02	MC2005F	Single 8-Input NAND Gate
SG-262-P	MC2005P	Single 8-Input NAND Gate
SG-263-02	MC2055F	Single 8-Input NAND Gate
SG-263-P	MC2055P	Single 8-Input NAND Gate
SG-270-02	MC2106F	Dual 4-Input Expander for AND-OR-INVERT Gates
SG-271-02	MC2156F	Dual 4-Input Expander for AND-OR-INVERT Gates
SG-272-02	MC2006F	Dual 4-Input Expander for AND-OR-INVERT Gates
SG-272-P	MC2006P	Dual 4-Input Expander for AND-OR-INVERT Gates

**MTTL II (cont.)**

Part Number	Motorola Direct Replacement	Description
SG-273-02	MC2056F	Dual 4-Input Expander for AND-OR-INVERT Gates
SG-273-P	MC2056P	Dual 4-Input Expander for AND-OR-INVERT Gates
SG-310-02	MC2113F	Dual Expandable 2-Wide, 2-Input AND-OR-INVERT Gate
SG-311-02	MC2163F	Dual Expandable 2-Wide, 2-Input AND-OR-INVERT Gate
SG-312-02	MC2013F	Dual Expandable 2-Wide, 2-Input AND-OR-INVERT Gate
SG-312-P	MC2013P	Dual Expandable 2-Wide, 2-Input AND-OR-INVERT Gate
SG-313-02	MC2063F	Dual Expandable 2-Wide, 2-Input AND-OR-INVERT Gate
SG-313-P	MC2063P	Dual Expandable 2-Wide, 2-Input AND-OR-INVERT Gate

**MDTL**

Fairchild		
U31909351X	MC953F	Dual J-K Flip-Flop
U31909359X	MC853F	Dual J-K Flip-Flop
U31909451X	MC956F	Dual J-K Flip-Flop
U31909459X	MC856F	Dual J-K Flip-Flop
U31909751X	MC955F	Dual J-K Flip-Flop
U31909759X	MC855F	Dual J-K Flip-Flop
U31909951X	MC952F	Dual J-K Flip-Flop
U31909959X	MC852F	Dual J-K Flip-Flop
U31993051X	MC930F	Dual 4-Input NAND Gate
U31993059X	MC830F	Dual 4-Input NAND Gate
U31993151X	MC931F	Clocked Flip-Flop
U31993159X	MC831F	Clocked Flip-Flop
U31993251X	MC932F	Dual 4-Input Buffer
U31993259X	MC832F	Dual 4-Input Buffer
U31993351X	MC933F	Dual 4-Input Expander
U31993359X	MC833F	Dual 4-Input Expander
U31993651X	MC936F	Hex Inverter
U31993659X	MC836F	Hex Inverter
U31993751X	MC937F	Hex Inverter
U31993759X	MC837F	Hex Inverter
U31994451X	MC944F	Dual 4-Input Power NAND Gate
U31994459X	MC844F	Dual 4-Input Power NAND Gate
U31994551X	MC945F	Clocked Flip-Flop
U31994559X	MC845F	Clocked Flip-Flop
U31994651X	MC946F	Quad 2-Input NAND Gate
U31994659X	MC846F	Quad 2-Input NAND Gate
U31994851X	MC948F	Clocked Flip-Flop
U31994859X	MC848F	Clocked Flip-Flop
U31994951X	MC949F	Quad 2-Input NAND Gate with 2 k Pullup Resistor
U31994959X	MC849F	Quad 2-Input NAND Gate with 2 k Pullup Resistor
U31995051X	MC950F	Pulse Triggered Binary
U31995059X	MC850F	Pulse Triggered Binary
U31995151X	MC951F	Monostable Multivibrator

Part Number	Motorola Direct Replacement	Description
U31995159X	MC851F	Monostable Multivibrator
U31996151X	MC961F	Dual 4-Input NAND Gate with 2 k Pullup Resistor
U31996159X	MC861F	Dual 4-Input NAND Gate with 2 k Pullup Resistor
U31996251X	MC962F	Triple 3-Input NAND Gate
U31996259X	MC862F	Triple 3-Input NAND Gate
U31996351X	MC963F	Triple 3-Input NAND Gate with 2 k Pullup Resistor
U31996359X	MC863F	Triple 3-Input NAND Gate with 2k Pullup Resistor
U5F993051X	MC930G	Dual 3-2 Input NAND Gate
U5F993059X	MC830G	Dual 3-2 Input NAND Gate
U5F993151X	MC931G	Clocked Flip-Flop
U5F993159X	MC831G	Clocked Flip-Flop
U5F993251X	MC932G	Dual 3-2 Input Buffer
U5F993259X	MC832G	Dual 3-2 Input Buffer
U5F993351X	MC933G	Dual 4-3 Input Expander
U5F993359X	MC833G	Dual 4-3 Input Expander
U5F994451X	MC944G	Dual 3-2 Input Power NAND Gate
U5F994459X	MC844G	Dual 3-2 Input Power NAND Gate
U5F994551X	MC945G	Clocked Flip-Flop
U5F994559X	MC845G	Clocked Flip-Flop
U5F994651X	MC946G	Quad Inverter
U5F994659X	MC846G	Quad Inverter
U5F994851X	MC948G	Clocked Flip-Flop
U5F994859X	MC848G	Clocked Flip-Flop
U5F994951X	MC949G	Quad Inverter with 2 k Pullup Resistor
U5F994959X	MC849G	Quad Inverter with 2 k Pullup Resistor
U5F995051X	MC950G	Pulse Triggered Binary
U5F995059X	MC850G	Pulse Triggered Binary
U5F995151X	MC951G	Monostable Multivibrator
U5F995159X	MC851G	Monostable Multivibrator
U5F996151X	MC961G	Dual 3-2 Input NAND Gate with 2 k Pullup Resistor
U5F996159X	MC861G	Dual 3-2 Input NAND Gate with 2 k Pullup Resistor
U5F996251X	MC962G	Dual 2-Input NAND Gate Plus Inverter
U5F996259X	MC862G	Dual 2-Input NAND Gate Plus Inverter
U5F996351X	MC963G	Dual 2-Input NAND Gate Plus Inverter
U5F996359X	MC863G	Dual 2-Input NAND Gate Plus Inverter
U6A909359X	MC853P	Dual J-K Flip-Flop
U6A909459X	MC856P	Dual J-K Flip-Flop
U6A909759X	MC855P	Dual J-K Flip-Flop
U6A909959X	MC852P	Dual J-K Flip-Flop
U6A993059X	MC830P	Dual 4-Input NAND Gate
U6A993159X	MC831P	Clocked Flip-Flop
U6A993259X	MC832P	Dual 4-Input Buffer
U6A993359X	MC833P	Dual 4-Input Gate Expander

## MDTL ( cont. )

Part Number	Motorola Direct Replacement	Description
U6A993659X	MC836P	Hex Inverter
U6A993759X	MC837P	Hex Inverter
U6A994459X	MC844P	Dual 4-Input Power NAND Gate
U6A994559X	MC845P	Clocked Flip-Flop
U6A994659X	MC846P	Quad 2-Input NAND Gate
U6A994859X	MC848P	Clocked Flip-Flop
U6A994959X	MC849P	Quad 2-Input NAND Gate with 2 k Pullup Resistor
U6A995059X	MC850P	Pulse Triggered Binary Monostable
U6A995159X	MC851P	Multivibrator
U6A996159X	MC861P	Dual 4-Input NAND Gate 2 k Pullup Resistor
U6A996259X	MC862P	Triple 3-Input NAND Gate
U6A996359X	MC863P	Triple 3-Input NAND Gate with 2 k Pullup Resistor

## ITT

MIC930-1B	MC930F	Dual 4-Input Gate
MIC930-1C	MC930G	Dual 3-2 Input Gate
MIC930-5B	MC830F	Dual 4-Input Gate
MIC930-5C	MC830G	Dual 3-2 Input Gate
MIC932-1B	MC932F	Dual 4-Input Buffer
MIC932-1C	MC932G	Dual 3-2 Input Buffer
MIC932-5B	MC832F	Dual 4-Input Buffer
MIC932-5C	MC832G	Dual 3-2 Input Buffer
MIC933-1B	MC933F	Dual 4-Input Expander
MIC933-1C	MC933G	Dual 4-3 Input Expander
MIC933-5B	MC833F	Dual 4-Input Expander
MIC933-5C	MC833G	Dual 4-3 Input Expander
MIC936-1B	MC936F	Hex Inverter
MIC936-5B	MC836F	Hex Inverter
MIC937-1B	MC937F	Hex Inverter
MIC937-5B	MC837F	Hex Inverter
MIC944-1B	MC944F	Dual 4-Input Power Gate
MIC944-1C	MC944G	Dual 3-2 Input Power Gate
MIC944-5B	MC844F	Dual 4-Input Power Gate
MIC944-5C	MC844G	Dual 3-2 Input Power Gate
MIC945-1B	MC945F	Clocked Flip-Flop
MIC945-1C	MC945G	Clocked Flip-Flop
MIC945-5B	MC845F	Clocked Flip-Flop
MIC945-5C	MC845G	Clocked Flip-Flop
MIC946-1B	MC946F	Quad 2-Input Gate
MIC946-5B	MC846F	Quad 2-Input Gate
MIC948-1B	MC948F	Clocked Flip-Flop
MIC948-1C	MC948G	Clocked Flip-Flop
MIC948-5B	MC848F	Clocked Flip-Flop
MIC948-5C	MC848G	Clocked Flip-Flop
MIC949-1B	MC949F	Quad 2-Input Gate
MIC949-5B	MC849F	Quad 2-Input Gate
MIC950-1B	MC950F	Pulse Triggered Binary
MIC950-1C	MC950G	Pulse Triggered Binary
MIC950-5B	MC850F	Pulse Triggered Binary
MIC950-5C	MC850G	Pulse Triggered Binary
MIC951-1B	MC951F	Monostable Multivibrator
MIC951-1C	MC951G	Monostable Multivibrator
MIC951-5B	MC851F	Monostable Multivibrator

Part Number	Motorola Direct Replacement	Description
MIC951-5C	MC851G	Monostable Multivibrator
MIC961-1B	MC961F	Dual 4-Input Gate
MIC961-1C	MC961G	Dual 3-2 Input Gate
MIC961-5B	MC861F	Dual 4-Input Gate
MIC961-5C	MC861G	Dual 3-2 Input Gate
MIC962-1B	MC962F	Triple 3-Input Gate
MIC962-5B	MC862F	Triple 3-Input Gate
MIC963-1B	MC963F	Triple 3-Input Gate
MIC963-5B	MC863F	Triple 3-Input Gate

## Philco

PE9930	MC830P	Dual 4-Input NAND Gate
PE9932	MC832P	Dual 4-Input Buffer
PE9933	MC833P	Dual 4-Input Gate Expander
PE9944	MC844P	Dual 4-Input Power NAND Gate
PE9945	MC845P	Clocked Flip-Flop
PE9946	MC846P	Quad 2-Input NAND Gate
PE9948	MC848P	Clocked Flip-Flop
PE9962	MC862P	Triple 3-Input NAND Gate
PL9930 51	MC930F	Dual 4-Input NAND Gate
PL9930 59	MC830F	Dual 4-Input NAND Gate
PL9931 51	MC931F	Clocked Flip-Flop
PL9931 59	MC831F	Clocked Flip-Flop
PL9932 51	MC932F	Dual 4-Input Buffer
PL9932 59	MC832F	Dual 4-Input Buffer
PL9933 51	MC933F	Dual 4-Input Expander
PL9933 59	MC833F	Dual 4-Input Expander
PL9936 51	MC936F	Hex Inverter
PL9936 59	MC836F	Hex Inverter
PL9944 51	MC944F	Dual 4-Input Power NAND Gate
PL9944 59	MC844F	Dual 4-Input Power NAND Gate
PL9945 51	MC945F	Clocked Flip-Flop
PL9945 59	MC845F	Clocked Flip-Flop
PL9946 51	MC946F	Quad 2-Input NAND Gate
PL9946 59	MC846F	Quad 2-Input NAND Gate
PL9948 51	MC948F	Clocked Flip-Flop
PL9948 59	MC848F	Clocked Flip-Flop
PL9950 51	MC950F	Pulse Triggered Binary
PL9950 59	MC850F	Pulse Triggered Binary
PL9951 51	MC951F	Monostable Multivibrator
PL9951 59	MC851F	Monostable Multivibrator
PL9962 51	MC962F	Triple 3-Input NAND Gate
PL9962 59	MC862F	Triple 3-Input NAND Gate

## RCA

CD2300/930	MC930F	Dual 4-Input Gate
CD2300E/830	MC830P	Dual 4-Input Gate
CD2301/961	MC961F	Dual 4-Input Gate
CD2301E/861	MC861P	Dual 4-Input Gate
CD2302/946	MC946F	Quad 2-Input Gate
CD2302E/846	MC846P	Quad 2-Input Gate
CD2303/949	MC949F	Quad 2-Input Gate



## MDTL (cont.)

Part Number	Motorola Direct Replacement	Description
CD2303E/849	MC849P	Quad 2-Input Gate
CD2304/945	MC945F	Clocked Flip-Flop
CD2304E/845	MC845P	Clocked Flip-Flop
CD2305/948	MC948F	Clocked Flip-Flop
CD2305E/848	MC848P	Clocked Flip-Flop
CD2306/932	MC932F	Dual 4-Input Buffer
CD2306E/832	MC832P	Dual 4-Input Buffer
CD2307/944	MC944F	Dual 4-Input Power Gate
CD2307E/844	MC844P	Dual 4-Input Power Gate
CD2308/962	MC962F	Triple 3-Input Gate
CD2308E/862	MC862P	Triple 3-Input Gate
CD2309/963	MC963F	Triple 3-Input Gate
CD2309E/863	MC863P	Triple 3-Input Gate
CD2310/936	MC936F	Hex Inverter
CD2310E/836	MC836P	Hex Inverter
CD2311/937	MC937F	Hex Inverter
CD2311E/837	MC837P	Hex Inverter
CD2314/933	MC933F	Dual 4-Input Expander
CD2314E/833	MC833P	Dual 4-Input Expander

## Raytheon

RC930J	MC830F	Dual 4-Input NAND Gate
RC930T	MC830G	Dual 3-2 Input NAND Gate
RC932J	MC832F	Dual 4-Input Buffer
RC932T	MC832G	Dual 3-2 Input Buffer
RC933J	MC833F	Dual 4-Input Expander
RC933T	MC833G	Dual 4-3 Input Expander
RC944J	MC844F	Dual 4-Input Power NAND Gate
RC944T	MC844G	Dual 3-2 Input Power NAND Gate
RC945J	MC845F	Clocked Flip-Flop
RC945T	MC845G	Clocked Flip-Flop
RC946J	MC846F	Quad 2-Input NAND Gate
RC946T	MC846G	Quad Inverter
RC948G	MC848F	Clocked Flip-Flop
RC948T	MC848G	Clocked Flip-Flop
RC950J	MC850F	Pulse Triggered Binary
RC950T	MC850G	Pulse Triggered Binary
RC951J	MC851F	Monostable Multivibrator
RC951T	MC851G	Monostable Multivibrator
RC962J	MC862F	Triple 3-Input NAND Gate
RC962T	MC862G	Dual 2-Input NAND Gate Plus Inverter
RC993J	MC853F	Dual J-K Flip-Flop
RC994J	MC856F	Dual J-K Flip-Flop
RC997J	MC855F	Dual J-K Flip-Flop
RC999J	MC852F	Dual J-K Flip-Flop
RM930J	MC930F	Dual 4-Input NAND Gate
RM930T	MC930G	Dual 3-2 Input NAND Gate
RM932J	MC932F	Dual 4-Input Buffer
RM932T	MC932G	Dual 3-2 Input Buffer
RM933J	MC933F	Dual 4-Input Gate Expander
RM933T	MC933G	Dual 4-3 Input Expander
RM944J	MC944F	Dual 4-Input Power NAND Gate
RM944T	MC944G	Dual 3-2 Input Power NAND Gate

Part Number	Motorola Direct Replacement	Description
RM945J	MC945F	Clocked Flip-Flop
RM945T	MC945G	Clocked Flip-Flop
RM946J	MC946F	Quad 2-Input NAND Gate
RM946T	MC946G	Quad Inverter
RM948J	MC948F	Clocked Flip-Flop
RM948T	MC948G	Clocked Flip-Flop
RM950J	MC950F	Pulse Triggered Binary
RM950T	MC950G	Pulse Triggered Binary
RM951J	MC951F	Monostable Multivibrator
RM951T	MC951G	Monostable Multivibrator
RM962J	MC962F	Triple 3-Input NAND Gate
RM962T	MC962G	Dual 2-Input NAND Gate plus Inverter
RM993J	MC953F	Dual J-K Flip-Flop
RM994J	MC956F	Dual J-K Flip-Flop
RM997J	MC955F	Dual J-K Flip-Flop
RM999J	MC952F	Dual J-K Flip-Flop

## Stewart Warner

SW705-1F	MC953F	Dual J-K Flip-Flop
SW705-2F	MC853F	Dual J-K Flip-Flop
SW706-1F	MC952F	Dual J-K Flip-Flop
SW706-2F	MC852F	Dual J-K Flip-Flop
SW708-1F	MC956F	Dual J-K Flip-Flop
SW708-2F	MC856F	Dual J-K Flip-Flop
SW709-1F	MC955F	Dual J-K Flip-Flop
SW709-2F	MC855F	Dual J-K Flip-Flop
SW930-1F	MC930F	Dual 4-Input Gate
SW930-1T	MC930G	Dual 3-2 Input Gate
SW930-2F	MC830F	Dual 4-Input Gate
SW930-2T	MC830G	Dual 3-2 Input Gate
SW932-1F	MC932F	Dual 4-Input Buffer
SW932-1T	MC932G	Dual 3-2 Input Buffer
SW932-2F	MC832F	Dual 4-Input Buffer
SW932-2T	MC832G	Dual 3-2 Input Buffer
SW933-1F	MC933F	Dual 4-Input Expander
SW933-1T	MC933G	Dual 4-3 Input Expander
SW933-2F	MC833F	Dual 4-Input Expander
SW933-2T	MC833G	Dual 4-3 Input Expander
SW936-1F	MC936F	Hex Inverter
SW936-2F	MC836F	Hex Inverter
SW937-1F	MC937F	Hex Inverter
SW937-2F	MC837F	Hex Inverter
SW944-1F	MC944F	Dual 4-Input Power Gate
SW944-1T	MC944G	Dual 3-2 Input Power Gate
SW944-2F	MC844F	Dual 4-Input Power Gate
SW944-2T	MC844G	Dual 3-2 Input Power Gate
SW945-1F	MC945F	Clocked Flip-Flop
SW945-1T	MC945G	Clocked Flip-Flop
SW945-2F	MC845F	Clocked Flip-Flop
SW945-2T	MC845G	Clocked Flip-Flop
SW946-1F	MC946F	Quad 2-Input Gate
SW946-1T	MC946G	Quad Inverter
SW946-2F	MC846F	Quad 2-Input Gate
SW946-2T	MC846G	Quad Inverter
SW948-1F	MC948F	Clocked Flip-Flop
SW948-1T	MC948G	Clocked Flip-Flop

MDTL ( cont. )

Part Number	Motorola Direct Replacement	Description
SW948-2F	MC848F	Clocked Flip-Flop
SW948-2T	MC848G	Clocked Flip-Flop
SW949-1F	MC949F	Quad 2-Input Gate
SW949-1T	MC949G	Quad Inverter
SW949-2F	MC849F	Quad 2-Input Gate
SW949-2T	MC849G	Quad Inverter
SW950-1F	MC950F	Pulse Triggered Binary
SW950-1T	MC950G	Pulse Triggered Binary
SW950-2F	MC850F	Pulse Triggered Binary
SW950-2T	MC850G	Pulse Triggered Binary
SW951-1F	MC951F	Monostable
		Multivibrator
SW951-1T	MC951G	Monostable
		Multivibrator
SW951-2F	MC851F	Monostable
		Multivibrator
SW951-2T	MC851G	Monostable
		Multivibrator
SW961-1F	MC961F	Dual 4-Input Gate
SW961-1T	MC961G	Dual 3-2 Input Gate
SW961-2F	MC861F	Dual 4-Input Gate
SW961-2T	MC861G	Dual 3-2 Input Gate
SW962-1F	MC962F	Triple 3-Input Gate
SW962-1T	MC962G	Dual 2-Input Gate
		Plus Inverter
SW962-2F	MC862F	Triple 3-Input Gate
SW962-2T	MC862G	Dual 2 Input Gate
		Plus Inverter
SW963-1F	MC963F	Triple 3-Input Gate
SW963-1T	MC963G	Dual 2-Input Gate
		Plus Inverter
SW963-2F	MC863F	Triple 3-Input Gate
SW963-2T	MC863G	Dual 2-Input Gate
		Plus Inverter
Sylvania		
S9301-02	MC930F	Dual 4-Input NAND Gate
S9303-02	MC830F	Dual 4-Input NAND Gate
S9311-02	MC931F	Clocked Flip-Flop
S9313-02	MC831F	Clocked Flip-Flop
S9321-02	MC932F	Dual 4-Input Buffer
S9323-02	MC832F	Dual 4-Input Buffer
S9331-02	MC933F	Dual 4-Input Expander
S9333-02	MC833F	Dual 4-Input Expander
S9441-02	MC944F	Dual 4-Input Power NAND Gate
S9443-02	MC844F	Dual 4-Input Power NAND Gate
S9451-02	MC945F	Clocked Flip-Flop
S9453-02	MC845F	Clocked Flip-Flop
S9461-02	MC946F	Quad 2-Input NAND Gate
S9463-02	MC846F	Quad 2-Input NAND Gate
S9481-02	MC948F	Clocked Flip-Flop
S9483-02	MC848F	Clocked Flip-Flop
S9621-02	MC962F	Triple 3-Input NAND Gate
S9623-02	MC862F	Triple 3-Input NAND Gate
Texas Instruments		
SN15830	MC830F	Dual 4-Input NAND Gate
SN15830N	MC830P	Dual 4-Input NAND Gate
SN15831	MC831F	Clocked Flip-Flop
SN15831N	MC831P	Clocked Flip-Flop
SN15832	MC832F	Dual 4-Input Buffer
SN15832N	MC832P	Dual 4-Input Buffer
SN15833	MC833F	Dual 4-Input Expander

Part Number	Motorola Direct Replacement	Description
SN15833N	MC833P	Dual 4-Input Expander
SN15844	MC844F	Dual 4-Input Power NAND Gate
SN15844N	MC844P	Dual 4-Input Power NAND Gate
SN15845	MC845F	Clocked Flip-Flop
SN15845N	MC845P	Clocked Flip-Flop
SN15846	MC846F	Quad 2-Input NAND Gate
SN15846N	MC846P	Quad 2-Input NAND Gate
SN15848	MC848F	Clocked Flip-Flop
SN15848N	MC848P	Clocked Flip-Flop
SN15850	MC850F	Pulse Triggered Binary
SN15850N	MC850P	Pulse Triggered Binary
SN15851	MC851F	Monostable
		Multivibrator
SN15851N	MC851P	Monostable
		Multivibrator
SN15862	MC862F	Triple 3-Input NAND Gate
SN15862N	MC862P	Triple 3-Input NAND Gate
SN15930	MC930F	Dual 4-Input NAND Gate
SN15931	MC931F	Clocked Flip-Flop
SN15932	MC932F	Dual 4-Input Buffer
SN15933	MC933F	Dual 4-Input Expander
SN15944	MC944F	Dual 4-Input Power NAND Gate
SN15945	MC945F	Clocked Flip-Flop
SN15946	MC946F	Quad 2-Input NAND Gate
SN15948	MC948F	Clocked Flip-Flop
SN15950	MC950F	Pulse Triggered Binary
SN15951	MC951F	Monostable
		Multivibrator
SN15962	MC962F	Triple 3-Input NAND Gate

DTL

Signetics		
CS700G	MC207F	Dual 3-2 Input NAND Gate
CS700K	MC207G	Dual 3-2 Input NAND Gate
CS701G	MC208F	Dual 3-2 Input NAND Gate
CS701K	MC208G	Dual 3-2 Input NAND Gate
CS704G	MC210F	Clocked R-S Flip-Flop
CS704K	MC210G	Clocked R-S Flip-Flop
CS705G	MC215F	Dual 3-Input AND Gate Expander
CS705K	MC215G	Dual 3-Input AND Gate Expander
CS709G	MC217F	Dual 3-Input Diode Array
CS709K	MC217G	Dual 3-Input Diode Array
NE101G	MC251F	4-Input NAND Gate
NE101K	MC251G	4-Input NAND Gate
NE102G	MC252F	3-Input NAND Gate
NE102K	MC252G	3-Input NAND Gate
NE105G	MC253F	6-Input AND Gate Expander
NE105K	MC253G	6-Input AND Gate Expander
NE110G	MC254F	3-Input Power NAND Gate
NE110K	MC254G	3-Input Power NAND Gate

**DTL (cont.)**

Part Number	Motorola Direct Replacement	Description
NE115G	MC256F	Dual 2-Input NAND Gate
NE115K	MC256G	Dual 2-Input NAND Gate
NE124G	MC259F	Clocked R-S Flip-Flop
NE124K	MC259G	Clocked R-S Flip-Flop
NE150G	MC255F	Line Driver
NE150K	MC255G	Line Driver
NE700G	MC257F	Dual 3-2 Input NAND Gate
NE700K	MC257G	Dual 3-2 Input NAND Gate
NE701G	MC258F	Dual 3-2 Input NAND Gate
NE701K	MC258G	Dual 3-2 Input NAND Gate
SE101G	MC201F	4-Input NAND Gate
SE101K	MC201G	4-Input NAND Gate
SE102G	MC202F	3-Input NAND Gate
SE102K	MC202G	3-Input NAND Gate
SE105G	MC203F	6-Input AND Gate Expander
SE105K	MC203G	6-Input AND Gate Expander
SE110G	MC204F	3-Input Power NAND Gate
SE110K	MC204G	3-Input Power NAND Gate
SE115G	MC206F	Dual 2-Input NAND Gate
SE115K	MC206G	Dual 2-Input NAND Gate
SE124G	MC209F	Clocked R-S Flip-Flop
SE124K	MC209G	Clocked R-S Flip-Flop
SE150G	MC205F	Line Driver
SE150K	MC205G	Line Driver

**MRTL**

Fairchild		
U3F990021X	MC900F	Buffer
U3F990022X	MC800F	Buffer
U3F990321X	MC903F	3-Input NOR Gate
U3F990322X	MC803F	3-Input NOR Gate
U3F990421X	MC904F	Half Adder
U3F990422X	MC804F	Half Adder
U3F990521X	MC905F	Half-Shift Register
U3F990522X	MC805F	Half-Shift Register
U3F990621X	MC906F	Half-Shift Register (w/o Inverter)
U3F990622X	MC806F	Half Shift Register (w/o Inverter)
U3F990721X	MC907F	4-Input NOR Gate
U3F990722X	MC807F	4-Input NOR Gate
U3F991421X	MC914F	Dual 2-Input NOR Gate
U3F991422X	MC814F	Dual 2-Input NOR Gate
U3F991521X	MC915F	Dual 3-Input NOR Gate
U3F991522X	MC815F	Dual 3-Input NOR Gate
U3F992621X	MC926F	J-K Flip-Flop
U3F992622X	MC826F	J-K Flip-Flop
U3F992721X	MC927F	Quad Inverter
U3F992722X	MC827F	Quad Inverter
U5B990029X	MC700G	Buffer
U5B990121X	MC901G	Counter Adapter
U5B990122X	MC801G	Counter Adapter
U5B990229X	MC702G	R-S Flip-Flop
U5B990329X	MC703G	3-Input NOR Gate
U5B990421X	MC904G	Half Adder
U5B990422X	MC804G	Half Adder
U5B990429X	MC704G	Half Adder
U5B990521X	MC905G	Half-Shift Register
U5B990522X	MC805G	Half-Shift Register

Part Number	Motorola Direct Replacement	Description
U5B990529X	MC705G	Half-Shift Register
U5B990621X	MC906G	Half-Shift Register (w/o Inverter)
U5B990622X	MC806G	Half-Shift Register (w/o Inverter)
U5B990721X	MC907G	4-Input NOR Gate
U5B990722X	MC807G	4-Input NOR Gate
U5B990729X	MC707G	4-Input NOR Gate
U5B991421X	MC914G	Dual 2-Input NOR Gate
U5B991422X	MC814G	Dual 2-Input NOR Gate
U5B991429X	MC714G	Dual 2-Input NOR Gate
U5B991621X	MC916G	J-K Flip-Flop
U5B991622X	MC816G	J-K Flip-Flop
U5B992329X	MC723G	J-K Flip-Flop
U5B997421X	MC974G	J-K Flip-Flop
U5B997422X	MC874G	J-K Flip-Flop
U5B997429X	MC774G	J-K Flip-Flop
U5C990321X	MC903G	3-Input NOR Gate
U5C990322X	MC803G	3-Input NOR Gate
U5D990021X	MC900G	Buffer
U5D990022X	MC800G	Buffer
U5D990221X	MC902G	R-S Flip-Flop
U5D990222X	MC802G	R-S Flip-Flop
U5F991521X	MC915G	Dual 3-Input NOR Gate
U5F991522X	MC815G	Dual 3-Input NOR Gate
U5F991529X	MC715G	Dual 3-Input NOR Gate
U5F992621X	MC926G	J-K Flip-Flop
U5F992622X	MC826G	J-K Flip-Flop
U5F992629X	MC726G	J-K Flip-Flop
U5F992721X	MC927G	Quad Inverter
U5F992722X	MC827G	Quad Inverter
U5F992729X	MC727G	Quad Inverter

**Philco**

PL9900 21	MC900G,F	Buffer
PL9901 21	MC901G,F	Counter Adapter
PL9902 21	MC902G,F	R-S Flip-Flop
PL9903 21	MC903G,F	3-Input NOR Gate
PL9904 21	MC904G,F	Half Adder
PL9904 29	MC704G,F	Half Adder
PL9905 21	MC905G,F	Half Shift Register
PL9906 21	MC906G,F	Half-Shift Register
PL9907 21	MC907G,F	4-Input NOR Gate
PL9914 21	MC914G,F	Dual 2-Input NOR Gate
PL9915 21	MC915G,F	Dual 3-Input NOR Gate
PL9916 21	MC916G,F	J-K Flip Flop
PL9923 21	MC916G,F	J-K Flip-Flop
PL9926 21	MC926G,F	J-K Flip-Flop

**mW MRTL**

Fairchild		
U3F990821X	MC908F	Half Adder
U3F990921X	MC909F	2-Input Buffer
U3F991021X	MC910F	Dual 2-Input NOR Gate
U3F991121X	MC911F	4-Input OR/NOR Gate
U3F991221X	MC912F	Half Adder
U3F991321X	MC913F	Type "D" Flip-Flop
U3F992121X	MC921F	Dual 2-Input Gate Expander
U5B990821X	MC908G	Half Adder
U5B990829X	MC808G	Half Adder
U5B990921X	MC909G	2-Input Buffer
U5B990929X	MC809G	2-Input Buffer
U5B991021X	MC910G	Dual 2-Input NOR Gate
U5B991029X	MC710G	Dual 2-Input NOR Gate
U5B991121X	MC911G	4-Input OR/NOR Gate
U5B991129X	MC811G	4-Input OR/NOR Gate
U5B991221X	MC912G	Half Adder
U5B991229X	MC812G	Half Adder
U5B991321X	MC913G	Type "D" Flip-Flop
U5B991329X	MC813G	Type "D" Flip-Flop

**mW MRTL ( cont. )**

Part Number	Motorola Direct Replacement	Description
U5B992121X	MC921G	Dual 2-Input Gate Expander
U5B992129X	MC721G	Dual 2-Input Gate Expander
Philco		
PL9908 21	MC908G,F	Half Adder
PL9908 23	MC808G,F	Half Adder
PL9909 21	MC909G,F	2-Input Buffer
PL9909 23	MC809G,F	2-Input Buffer
PL9910 21	MC910G,F	Dual 2-Input Gate
PL9912 23	MC810G,F	Dual 2-Input Gate
PL9911 21	MC911G,F	4-Input Gate
PL9911 23	MC811G,F	4-Input Gate
PL9912 21	MC912G,F	Half Adder
PL9913 21	MC913G,F	Type "D" Flip-Flop
PL9913 23	MC813G,F	Type "D" Flip-Flop
PL9921 21	MC921G,F	Dual 2-Input Gate Expander
PL9921 23	MC821G,F	Dual 2-Input Gate Expander
PL9939 21	MC918G,F	Dual 3-Input Gate
PL9931 23	MC818G,F	Dual 3-Input Gate

Part Number	Motorola Direct Replacement	Description
PL9940 21	*MC920G,F	J-K Flip-Flop
PL9940 29	*MC720G,F	J-K Flip-Flop

\* Not pin-for-pin replacement.

Texas Instruments		
SN17 808L	MC808G	Half Adder
SN17 809L	MC809G	2-Input Buffer
SN17 810L	MC810G	Dual 2-Input Gate
SN17 811L	MC811G	4-Input Gate
SN17 812L	MC812G	Half Adder
SN17 813L	MC813G	Type "D" Flip-Flop
SN17 908L	MC908G	Half Adder
SN17 909L	MC909G	2-Input Buffer
SN17 910L	MC910G	Dual 2-Input Gate
SN17 911L	MC911G	4-Input OR/NOR Gate
SN17 912L	MC912G	Half Adder
SN17 913L	MC913G	Type "D" Flip-Flop

**LINEAR INTEGRATED CIRCUITS**
**Operational Amplifiers**

Amelco	
805 BE	MC1533G*
A13-215	MC1531G*
A13-251	MC1530G*
General Electric	
4JPA135	MC1531G*
Fairchild	
U3H771231X	MC1712F
U3H771239X	MC1712CF
U3I770929X	MC1709CF
U3I770931X	MC1709F
U5B770931X	MC1709G
U5B770939X	MC1709CG
U5B771231X	MC1712G
U5B771239X	MC1712CG
National	
LM101	MC1539G*
Philco	
PA70931	MC1709F
PA70931	MC1709G
PA70939	MC1709CF
PA70939	MC1709CG
PA71231	MC1712F
PA71231	MC1712G
PA71239	MC1712CF
PA71239	MC1712CG
RCA	
CA3008	MC1430F*
CA3010	MC1430G*
CA3015	MC1430G*
CA3016	MC1430F*
CA3022	MC1709CG*
CA3031	MC1709G*
Raytheon	
RM702	MC1712CF
RM702	MC1712CG
RM702	MC1712F
RM702	MC1712G
RM709	MC1709CF

RM709	MC1709CG
RM709	MC1709F
RM709	MC1709G
RM4709	MC1437P*
Signetics	
NE505G	MC1430F*
NE505K	MC1430G*
NE505G	MC1431F*
NE505K	MC1431G*
SE505G	MC1530F*
SE505G	MC1531F*
SE505K	MC1530G*
SE505K	MC1531G*
Texas Instruments	
SN726	MC1430F*
SN728	MC1431F*
SN52702	MC1712F
SN52702L	MC1712G
SN52709	MC1709F
SN52709L	MC1709G
SN72702	MC1712CF
SN72702L	MC1712CG
SN72709	MC1709CF
SN72709L	MC1709CG
Westinghouse	
WS161Q	MC1531F*
WS174Q	MC1709F*

CA3004	MC1550G*
CA3014	MC1314G*
Signetics	
SE501K	MC1552G*
Texas Instruments	
SN5510L	MC1510G
SN5510	MC1510F†
SN5510	MC1509F
Westinghouse	
WM1146T	MC1550G*

**Sense Amplifiers**

Fairchild	
U3H771031X	MC1710F
U3H771039X	MC1710CF
U3I771131X	MC1711F
U5B771031X	MC1710G
U5B771039X	MC1710CG
U5F771131X	MC1711G
Philco	
PA71031	MC1710F
PA71031	MC1710G
PA71039	MC1710CF
PA71039	MC1710CG
Raytheon	
RM710	MC1710CF
RM710	MC1710CG
RM710	MC1710F
RM710	MC1710G
Sylvania	
SA-10	MC1540F*
Texas Instruments	
SN5500	MC1540F*
SN52710	MC1710F
SN52710L	MC1710G
SN72710	MC1710CF
SN72710L	MC1710CG

**High-Frequency Amplifiers**

Fairchild	
SH9004	MC1110G
U5D770339X	MC1550G*
Philco	
PA713	MC1550G*
PA7601	MC1550G*
RCA	
CA3002	MC1550G*
CA3003	MC1550G*

\* Nearest equivalent

†Electrically interchangeable; pin-outs different.

## DIGITAL APPLICATION SELECTOR GUIDE

This table shows the various circuit functions available in each integrated circuit logic family. "F" indicates the device is available in ceramic flat package, "G" indicates metal can, and "P" indicates dual in-line plastic package.

Many of these devices have provision for expanding input capability. See individual family specifications for detail.

FUNCTION (Positive Logic)	MECL	MECL II	MHTL	MTTL	MTTL II	MTTL III	MDTL	DTL	MRTL	mW MRTL	MOS
<b>GATES</b>											
Quad Inverter							G		F,G		
Hex Inverter							F,P		F,P		
3-Input OR/NOR Gate	F,G										
4-Input OR/NOR Gate										F,G	
5-Input OR/NOR Gate	F,G										
6-Input OR/NOR Gate		F,P									
Dual 2-Input OR/NOR Gate	G	F,P									
Dual 4-Input OR/NOR Gate	F	F,P									
3-Input NOR Gate									F,G		
4-Input NOR Gate									F,G		
5-Input NOR Gate									F,G	F,G	
Dual 2-Input NOR Gate	F,G								F,G	F,G	
Dual 3-Input NOR Gate	F,G								F,G,P	F,G,P	
Dual 4-Input NOR Gate									F,G,P	F,P	
Triple 3-Input NOR Gate		F,P							F,P	F,P	
Quad 2-Input NOR Gate	F	F,P				F,P	F,P		F,P	F,P	
3-Input NAND Gate								F,G			
4-Input NAND Gate								F,G			
8-Input NAND Gate				F,P	F,P	F,P					
Dual 2-Input NAND Gate								F,G			
Dual 3-2 Input NAND Gate							G	F,G			
Dual 3-Input NAND Gate								F,G			
Dual 4-Input NAND Gate			P	F,P	F,P		F,P				
Dual 2-Input NAND Gate plus Inverter							G				
Triple 3-Input NAND Gate			P	F,P	F,P	F,P	F,P				
Quad 2-Input NAND Gate			P	F,P	F,P	F,P					
Quad 2-Input OR Gate						F,P					
6-Input AND Gate								F,G			
Dual 3-Input AND Gate								F,G			
Quad 2-Input AND Gate						F,P					
Quad Exclusive NOR Gate		F,P									
Quad Exclusive OR Gate		F,P							F,P		
2-Wide 3-Input AND-OR-INVERT Gate with Gated Complement				F,P							
2-Wide 4-Input AND-OR-INVERT Gate				F,P	F,P						
3-Wide 3-Input AND-OR-INVERT Gate				F,P							
4-Wide 2-2-2-3 Input AND-OR-INVERT Gate				F,P	F,P						
Dual 2-Wide 2-Input AND-OR-INVERT Gate				F,P	F,P	F,P					

### GATE EXPANDERS

5-Input Gate Expander	F,G										
6-Input Gate Expander								F,G			
Dual 2-Input Gate Expander										F,G	
Dual 3-Input Gate Expander								F,G			
Dual 3-4 Input Gate Expander							G				
Dual 4-Input Expander for NAND Gates				F,P			F,P				
Dual 4-Input Expander for AND-OR-INVERT Gates				F,P	F,P	F,P					
Dual 4-Input Gate Expander			P						F,P		
Dual 4-5 Input Gate Expander		F,P									
4-Wide 3-2-2-3 Input Expander for AND-OR-INVERT Gates				F,P	F,P						
Quad 2-Input Gate Expander									F,P	F,P	
Hex Expander									F,P		

(continued on next page)

## DIGITAL APPLICATION SELECTOR GUIDE (continued)

FUNCTION (Positive Logic)	MECL	MECL II	MHTL	MTTL	MTTL II	MTTL III	MDTL	DTL	MRTL	mW MRTL	MOS
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### FLIP FLOPS

J-K Flip-Flop	F,G	F,P		F,P	F,P	F,P	F,G,P		F,G,P	F,G,P	
R-S Flip-Flop	F,G		P	F,P					G		
Clocked R-S Flip-Flop							F,G,P	F,G			
Type D Flip-Flop		F,P								F,G	
Dual J-K Flip-Flop			P			F,P	F,P		F,P	F,P	
Dual Clocked R-S Flip-Flop		F,P									
Dual Type D Flip-Flop						F,P				F,P	

### DRIVERS & BUFFERS

3-Input NAND Power Gate								F,G			
Dual 3-2 Input NAND Power Gate							G				
Dual 4-Input NAND Power Gate						F,P	F,P				
Dual 4-Input AND Power Gate						F,P					
Bias Driver	F,G										
Line Driver	F,G		P	F,P		F,P	F,G,P	F,G			
Lamp Driver	F,G						G				
Dual 2-Input Clock Driver	G										
Dual 4-Input OR/NOR Clock Driver	F	P									
Buffer Inverter									F,G		
2-Input Buffer										F,G	
Dual Buffer Inverter									F,G,P		
Dual 2-Input Buffer										F,G,P	
Dual 3-2 Input Buffer							G				
Dual 3-Input Buffer									F,P		
Dual 4-Input Buffer							F,P				

### MISCELLANEOUS

Half Adder	F,G								F,G	F,G	
Dual Half Adder									F,P		
Full Adder		F,P							F,G	F,G	
Dual Full Adder									F,P		
Full Subtractor		F,P									
Dual Full Subtractor									F,P		
Half-Shift Register									F,G		
Half-Shift Register (without inverter)									F,G		
Dual Half-Shift Register									F,P		
Dual Half-Shift Register (without inverter)									F,P		
Monostable Multivibrator							F,G,P				
Level Translator	F,G	F,P									
Quad Line Receiver		F,P									
1 J-K FF, 1 Expander, 2 Buffers									P		
1 J-K FF, 1 Inverter, 2 Buffers									P		
Dual 3-Input Diode Array								F,G			
Counter Adapter									G		
Decade Counter							F,P				
Binary Up Counter (Divide by 16)							F,P				
Data Distributor		F,P									
Dual Keyer Gate											P
Frequency Divider											P
16-Bit Memory		P									